**A PYTHON PROGRAM TO IMPLEMENT DECISION TREE**

**Ex.No.: 7 Date of Experiment: 04/10/2024**

# AIM:-

To implement a decision tree using a python program for the given dataset and plot the trained decision tree.

# ALGORITHM:-

Step1: Import the iris dataset from the “sklearn.datasets” library.

Step2: Import all the other necessary libraries(numpy as np, matplotlib.pyplot as plt and DecisionTreeClassifier from sklearn.tree).

Step3: Declare and initialize the parameters(n\_classes = 3,plot\_colors = "ryb" and plot\_step =

0.02)

Step4: Loop through the list of features and assign “X” with all the pairs in the list and “Y” with the target list.

Step5: Train the model and assign it to a variable name “clt”.

Step6: Use the “pairidx” variable to plot the graph.

Step7: Assign “x\_min”, “x\_max”, “y\_min” and “y\_max” variables with the respective values from the list.

Step8: Assign the variables “X” and “Y” the values obtained by using the “meshgrid()” function on arranged x\_min,x\_max and y\_min,y\_max.

Step9: Plot the graph using the “tight\_layout” function and the following parameters(h\_pad=0.5, w\_pad=0.5, pad=2.5).

Step10: Assign the prediction using the variables “xx” and “yy” and then reshape Z to the shape of “xx”.

Step11: Plot the graphs using “xx”, “yy” and “Z” as the parameters and with the “RdYlBu”(red,yellow and blue) color scheme.

Step12: Plot all the x\_label and y\_label feature pairs.

Step13: Plot all the training points with “RdYlBu '' color scheme, black color to represent the points and with size equal to 15.

Step14: Plot the final decision tree with the title “Decision tree trained on all the iris

# features”. IMPLEMENTATION:-

from sklearn.datasets import load\_iris iris = load\_iris() import numpy as np

import matplotlib.pyplot as plt from sklearn.tree import DecisionTreeClassifier

# Parameters n\_classes = 3 plot\_colors = "ryb" plot\_step = 0.02 for pairidx, pair in enumerate([[0, 1], [0, 2], [0, 3], [1, 2], [1, 3], [2, 3]]):

# We only take the two corresponding features X = iris.data[:, pair] y = iris.target

# Train clf =

DecisionTreeClassifier().fit(X, y)

# Plot the decision boundary plt.subplot(2, 3, pairidx + 1) x\_min, x\_max = X[:, 0].min() - 1, X[:, 0].max() + 1 y\_min, y\_max = X[:, 1].min() - 1, X[:, 1].max() + 1 xx, yy

= np.meshgrid(

np.arange(x\_min, x\_max, plot\_step), np.arange(y\_min, y\_max, plot\_step)

)

plt.tight\_layout(h\_pad=0.5, w\_pad=0.5, pad=2.5)

Z = clf.predict(np.c\_[xx.ravel(), yy.ravel()]) Z = Z.reshape(xx.shape) cs = plt.contourf(xx, yy, Z, cmap=plt.cm.RdYlBu)

plt.xlabel(iris.feature\_names[pair[0]]) plt.ylabel(iris.feature\_names[pair[1]])

# Plot the training points for i, color in zip(range(n\_classes), plot\_colors):

idx = np.where(y == i)

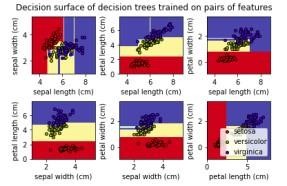
plt.scatter(

X[idx, 0],

X[idx, 1], c=color, label=iris.target\_names[i], cmap=plt.cm.RdYlBu, edgecolor="black", s=15)

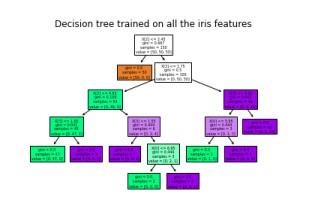
plt.suptitle("Decision surface of decision trees trained on pairs of features") plt.legend(loc="lower right", borderpad=0, handletextpad=0)

\_ = plt.axis("tight")



from sklearn.tree import plot\_tree plt.figure()

clf = DecisionTreeClassifier().fit(iris.data,iris.target) plot\_tree(clf, filled=True) plt.title("Decision tree trained on all the iris features") plt.show()



# RESULT:-

Thus the python program to implement Decision Tree for the given dataset has been successfully implemented and the results have been verified and analyzed.